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PATENT SPECIFICATION

NO DRAWINGS

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COMPLETE SPECIFICATION

Yeast Product

We, HENRI GRIFFON, of 2 Place Mazas, Paris 12, France, and GEORGES TIXIER, of 18 Rue Hamelin, Paris 16, France, both French citizens, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to a new product based on living yeast and a process by which it is prepared. It is an improvement in the invention claimed in our earlier Patent Specification No. 970944.

Patent Specification No. 970944 claims a yeast preparation comprising a homogeneous dispersion of fresh, living yeast and dry powdered starch, in which said yeast comprises between 25% and 75% of the mixture; the particles of said starch being substantially of the same order of size as the cells of said yeast; said mixture being dehydrated; after dehydration said mixture being in hygroscopic equilibrium with the atmosphere and said cells neither growing nor dying, but existing in a state of suspended animation; said dehydrated mixture being pressed into the form of tablets, whereby division of the cells of said yeast is inhibited, but the morphology and organoleptic properties of said yeast remain unchanged.

The present application relates to improvements in the method described in the Parent Patent and provides an improvement in the method of preparing a composition of yeast and starch as described in Specification No. 970944 which comprises mixing yeast with water in amounts of the order of 30 litres of water per 100 kg. of yeast until a homogeneous creamy suspension is obtained, adding starch to this preparation in successive portions while stirring the mixture to make it homogeneous until a soft paste is obtained, granulating and drying the grains at a temperature not exceeding 37°C until the moisture content is from 8 to 15% by weight,

to give a composition containing 60 to 80% by weight of yeast cells.

Test have shown that the proportion of living cells in the final product is directly dependent upon the manner in which the mixing and drying operations are carried out, and that the quality of the tablets is affected by the compression rate.

The Parent Patent describes a process for the preparation of dry yeast from industrial pressed yeast with a 71% water content, which comprises mixing the yeast with sufficient amounts of starch to give a paste, which is spread in a thin layer and is then dehydrated in a stream of air heated to a temperature not exceeding 35°C.

The mixing operation requires some considerable mechanical effort because of the doughy consistency of the yeast-starch mixture, and experience has shown that it is difficult in this way to preserve percentages of living yeast above 30 to 40%. This means that a certain proportion of the yeast is killed during preparation. If, however, a composition prepared by such a process is studied through a microscope, particularly when the yeasts are stained by the method of Funk and Kuhles [Woch Brauerei, Vol. 50 (1933) p 185] in which the dead cells are stained by methylene blue and the living cells are not stained, no appreciable morphological differences between the dead yeast cells and the living cells can be observed. A more intensive investigation reveals, however, that under the mechanical pressure of mixing, a certain number of the cells have largely been deprived of the cellular content, which has escaped through a hole, generally formed at one of the poles of the ellipsoid of revolution representing the shape of the yeast cells. This hole corresponds to the site where the cell was separated from the parent cell after cell-division, so that this site remains, as it were, a cicatricial region of lower resistance.

In accordance with the present invention,

- excellent results, i.e. an increase in the percentage of living cells, are obtained by firstly preparing a fairly thick, creamy suspension from the yeast by mixing it with a certain amount of water, and then adding starch in portions, while stirring the mixture to make it homogeneous. The resulting final mixture is mixed, preferably mechanically, until its consistency is not that of a stiff dough, but that of a soft paste. The mixture is granulated and the granulate dried.
- By working in this way, it is possible to obtain a preparation which contains 8 to 12% by weight water and from 6 to 8×10^9 living cells per gramme.
- The amount of water required for the preparation of the initial creamy yeast suspension is from 20 to 40% by weight.
- The proportion of living cells obtained in the product is from 60% to 80%, in other words, it is almost twice that obtained in the product according to Specification No. 970944.
- EXAMPLE**
- a) 30 litres of purified water are introduced into a mixer.
- b) The mixer is started and 100 kilogrammes of yeast of known water content are introduced.
- c) The mixer is kept working until a homogeneous paste is obtained.
- d) The quantity of starch specified in the following Table I is weighed after its water content has been determined and the starch is introduced into the mixer, which is kept in operation until the starch forms a homogeneous paste with the mixture of water and yeast.
- e) This paste is granulated by means of a granulating machine (3 mm. mesh screen).
- f) Dehydration may be carried out as follows:
- The granulate may either be spread in the form of a thin layer on dehydration plates which are introduced into an air chamber or conditioned inert gas atmosphere, or a dehydration machine may be used. In each case the temperature must not exceed 37°C.
- g) Drying is continued until the moisture content of the product is from 8 to 15% by weight, preferably from 8 to 10% by weight.
- The product is thus obtained in the form of a light beige-coloured powder, the weight of which represents that of the fresh yeast used (100 kg).
- h) Including any losses which may occur as a result of repeated handling the final product comprises 100 kilogrammes $\pm 10\%$, the moisture content of which varies from 9 to 18% by weight, the most preferable content being 15% by weight.
- i) The final product is collected in containers and hermetically sealed.

TABLE I

Moisture content in % by weight	Quantity of starch to be used in kg. per 100 kg. of yeast
13	66.6
14	67.4
15	68.2
16	69.0
17	69.8
18	70.7
19	71.6
20	72.2

- Patent Specification No. 970944 describes the conversion of the product in powder form into tablets in which division of the yeast cells is inhibited, but in which the cells retain the morphology and organoleptic properties of the initial powder.
- The effect of the compression rate on the number of living yeast cells was demonstrated by a series of tests which showed that, when the pressure applied reaches 1600 kg. per square centimetre, in the case of a 6.3 mm. tablet, the number of living yeast cells per gramme is 1.8×10^9 . When the pressure is increased to 2600 kg. per square centimetre, the number of living yeast cells per gramme is 260×10^9 . Pressures exceeding 2600 kg. per square centimetre and reaching 4,000 kg. per square centimetre, for example, kill all the yeast cells.
- If modern machines are used, the preparation of a tablet takes 2/10ths of a second so that, by using such machines, 300 tablets with an average weight of 0.44 gram may be made per minute.
- The following Table 2 summarises the effect of the compression rate on the number of living cells:

TABLE II

Number of cells per gramme (millions)

Compression in kg/cm ² .	Tablet thickness in mm.	Total No. of cells	No. of living cells	No. of dead cells	Percentage of living cells
0		10,000	4,400	5,250	44.0
800	7.4	10,000	4,000	6,000	40.0
1,000	7.1	10,000	4,000	6,000	40.0
1,200	6.9	10,000	3,500	6,250	35.0
1,400	6.6	9,000	2,500	6,350	28.0
1,600	6.3	8,800	1,800	7,000	20.5
1,800	5.9	8,350	700	7,650	8.4
2,100	5.7	8,180	360	7,820	4.4
2,600	5.4	8,000	260	7,740	3.25
2,800	5.2	8,000	0	8,000	0
3,300	5.2	7,250	0	7,250	0
4,000	5.2	7,250	0	7,250	0

This table shows clearly how the number of cells per gramme may be reduced to zero or to any other desired value. Within the scope of the invention, it is preferred to kill at least the majority and possible all the yeast cells.

Thus, in the tablets according to the invention, the yeast cells are killed and lose their vitality, but retain their other properties, in particular their colour, odour and taste.

This constitutes a considerable advantage over other methods which, by using other conditions, detrimentally affect the organoleptic properties of the yeast and give end products which are brown in colour and taste of peptone.

If, in accordance with the invention, the dehydrated yeast/starch grains are subjected to a sudden and violent mechanical impact, in conjunction with thermal shock treatment, tablets of outstanding quality are obtained.

In general, pressure of the order of 1500 kg. per square centimetre are used in the preparation of the tablets. Such pressures ensure the firmness of the tablet and are not at the limit of endurance of the machines used.

In order to prepare the tablets according to the invention in which there are no living yeast cells, pressures of at least 2,800 kg. per square centimetre must be used, as shown

in the foregoing Table. To prepare the tablets according to the invention, in which the majority of the yeast cells have been killed, pressures of the order of 1,500 kg per square centimetre may be used.

WHAT WE CLAIM IS:

1. A modification or improvement in the method of preparing a composition of yeast and starch as described in Specification No. 970944 which comprises mixing yeast with water in amounts of the order of 30 litres of water per 100 kg. of yeast until a homogeneous creamy suspension is obtained, adding starch to this preparation in successive portions while stirring the mixture to make it homogeneous until a soft paste is obtained, granulating and drying the grains at a temperature not exceeding 37°C until the moisture content is from 8 to 15% by weight, to give a composition containing 60 to 80% by weight of yeast cells.

2. A method as claimed in claim 1 wherein the composition is formed into tablets at a compression rate sufficient to kill at least the majority of the yeast cells while maintaining their morphological and organoleptic properties.

3. A method as claimed in claim 2 wherein the compression rate is sufficient to kill all the yeast cells.

4. A method as claimed in claim 1 substantially as hereinbefore described with reference to the Example and to either Table.

5. A composition comprising yeast and starch when prepared by a method as claimed in any of the preceding claims.

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